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ABSTRACT OF THE DISCLOSURE

5 A fuel cell system having a stack of proton
exchange membrane fuel cells is operated in sub-
freezing temperatures by draining any liquid water
from the fuel cell water flow passages upon or after
the previous shut-down of the stack before freezing
can occur, and, thereafter a) starting-up the stack
by directing fuel and oxidant reactants into the
cell and connecting a load to the stack; b) using
10 heat produced by the stack to increase the operating
temperature of the stack to melt ice within the
stack; and, c) upon the stack operating temperature
reaching at least 0°C, circulating anti-freeze
through stack coolers to maintain the temperature of
15 the stack low enough to maintain a sufficiently low
water vapor pressure within the cells to prevent
cell dry out for at least as long as there is
insufficient liquid water to circulate through the
water flow passages.